

50X1-HUM

CONFIDENTIAL/US OFFICIALS ONLY

USSR

Electrical Power for Farms and Industrial Cooperatives Created by New Windmover D-18

Sep 49

following Soviet article entitled "The New Windmover D-18" written by AV Karmishin, Stalin Award Winner.

50X1-HUM

"Rural windmills, in spite of their enormous size, possess usually a small horsepower output (8-10 h.p.). They transform not more than 8 to 10 percent of the air current force into useful work. Windwheels move slowly and unevenly because they are not outfitted for limitation or regulation of revolutions during high speeds of wind. During a tempest it is necessary to remove the windwheels by hand away from the wind in order to protect the mill from destruction.

"Before the Russian revolution, windmills, to a certain extent, satisfied the needs of the peasant households, principally for the grinding of grain. But they certainly cannot guarantee the mechanization of essential stationary productive processes of the socialistic village.

"With the evolution of machine construction there appeared in the rural economy a type of all-metal windmover with multi-blade windwheel, on a round frame on which are centered 18 to 25 blades of the simplest aerodynamic form. These windmovers transform into useful work already up to 30% energy of the air current power, while their windwheels during the high speeds of the air current force automatically disengage themselves from the wind and the number of their revolutions diminishes. Many of the multi-bladed windmovers possess regulating mechanism. Even in high frequency winds, the turning aside of the speed of the rotation of the windwheels does not exceed 12 to 15% of the stipulated number of revolutions, which is allowable for the working of many machines of the rural economy.

"Multi-blade windwheels of a diameter of more than 8 to 10 meters cannot be sturdy, and therefore from such windmovers one can obtain useful force sufficient only for light mechanization of separate productive processes in the kolkhoz (Collective farm) (not more than 8 to 8 h.p.). Besides, the uneven rotation of the windwheels of the multi-blade movers makes it very difficult of their utilization for electrification.

CONFIDENTIAL/US OFFICIALS ONLY

CONFIDENTIAL/US OFFICIALS ONLY

- 2 -

"It has been established by tests, that for electrification of complex mechanization of productive processes it is imperative in kolkhoz (collective farms) and Sovhoz (State farms) to have a powerful installation of an output of 20 to 30 KW. The new Soviet windmover D-18, with its fast-moving windwheel of an 18-meter diameter, develops a useful force up to 30 h.p. on a reducer pulley, and in this manner it serves the indicated (prescribed) purpose. This windmover was designed on the basis of aerodynamic researches and experimental works of Prof. N. A. Zhukovski, done at the Central Aero-Hydrodynamic Institute (CAGI).

"The windwheel of windmover D-18 consists of three blades of completely metallized construction. Each blade in section has a modern aerodynamic profile and in construction reminds one of a wing of an airplane. The end parts of the blade can turn on tubular flywheel by aid of additional plane surface - stabilizers, which are situated on light bars (bases) behind the veering part of each wing. Inside the empty blade there are centrifugal weights, joined systematically (by a system of) pulleys and levers with stabilizers and regulated coils (springs), placed at the central hub (spider) of the windwheel. The hard (rough) and turning parts of the blades remain in the same plane surface until such time, when the wind reaches a designated speed. During the increase of speed of wind force (current) the turns of the windwheel increase along with the centrifugal forces of the weights inside the blades. The stabilizers turn the blades to a certain angle and the control springs (coils) expand (extend). Because of this, the pressure of the wind upon the stabilizers is increased, and the latter turn aside the veering (turning) parts of the blades from the rotated plane surface, inducing the braking of the windwheel up to a designated number of rotations. During an increase of wind, the end-blades turn at a large angle increasing the braking process and restraining the rotation of the windwheel in designated limits. During the lessening of the speed of wind, the control coils consequently restore the whole system to its original state (position).

"This original system of regulation (control), proposed by Professors G.M. Sabinin and N.V. Krasovsky and tested by experiments in (CAGI) (Central Aero-Hydrodynamic Institute), distinguishes itself by its high aerodynamic quality and guarantees equally good rotation of the windwheel during a variable wind. Deviation of the quantity of turns is restrained to the extent of 2 to 3 percent from the calculation.

"The high aerodynamic quality of the blades guarantees (assures) the fast movement of the windwheel. Thanks to this it was possible to reduce the construction weight of this windmover to a unit of force nearly twice that of the weight of the multi-bladed machines. A small number of blades in the windwheel reduces the pressure of the wind on the construction and eases the weight of the tower.

"The air current pretty often changes not only its intensity, but also its direction. Thusly, the windmover D-18 is equipped with a mechanism for automatic turn of the head to the wind. The mechanism consists of two multi-bladed vanes which are assembled on the back part of the frame of the head. The plane surfaces (flatness) of the vanes are arranged under (at) right angles to the plane surfaces of the rotation of the working windwheel. Therefore, when the windwheel is sharply against the wind, the vanes are immobile (motionless). They begin only then to turn, when the wind changes its direction some 10-15%. Turning, the vanes very slowly bring the head into the wind and stop, when the windwheel is sharply against the air current, and their rotating plane surfaces stand sideways (aside) to its direction. Big and fast-moving windmovers must indispensably be equipped with vanes, in order to avoid sharp turns of the head, which can lead to the breakage of the main shaft or the flywheel of the windwheel.

"Thusly, due to its aerodynamic and constructive display (evidence), the fast-moving windmover D-18 is a completely up-to-date aggregate (mass), which can assure the working (improving) demands (requirements), presented to the strong installation of a scant power (force).

"The task (job) of any windmover depends on the constancy and strength of the wind. Therefore it is necessary to utilize the wind-powered installations in appropriate work, and in first order, there, where the productive processes will not suffer from breaks (stops), which can be brought about by periods of a calm or a weak wind.

CONFIDENTIAL/US OFFICIALS ONLY

CONFIDENTIAL/US OFFICIALS ONLY

- 3 -

"It is of utmost importance to utilize the windmovers of small and medium power for mechanization of the stationary productive processes of the rural economy. Thus, the windmover D-18 working with a centrifugal pump or with a group of small pumps with a pressure of 10 - 20 meters, can secure (guarantee) sprinkling an area of 20 to 35 Ga (TRANSLATOR'S NOTE: 'Ga' may mean 'Garnets,' which in dry measure is equal to 2.56 American quarts or 2.9 liters in metric system; or 'Ga' may be the Russian abbreviation for our hectare') of a watered norm (standard) of 600 to 800 cubic meters water at one watering. In the central black-soil zone of the U.S.S.R., taking into consideration the topographic and wind conditions, by aid of these windmovers one can accomplish the watering up to 10% of the designated-for-watering areas.

"The D-18's wind-powered installation can also be utilized to the utmost with success for complex mechanization of the most difficult processes of cattle breeding, including enforced forage (feed) and electrical lighting of the buildings of the cattle-breeding farms with their big-horned cattle up to 250 head.

"During the autumn-winter period, when as a rule, everywhere the wind becomes stronger, one can transfer the work of the wind-powered installations to be used mostly in rural economy for thrashing machines BUC-74 and BR-23, and also for the utilization of the flour grinding. Windmover D-18, working as a grind-stone installation as well as small rolling-mill, having the equipment for the cleaning of the grain and straining of flour, is able to assure for the medium kolkhoz (collective farm) a supply of flour of high quality and forage grinding.

"The windmovers D-18 can have wide application for strong service of the kolkhoz's productive and artisan workshops, as well as in the field of enterprises of local and industrial co-operatives.

"By decree of October 26, 1947, the Council of Ministers of the U.S.S.R. proposed to the Ministry of rural economy of the U.S.S.R. to rig up and test in 1948 seven D-18 wind-powered installations.

"The Ministry of Transport aims to utilize the wind-electric installations D-18 for supplying small railway stations and adjoining small workers' villages with electric energy of direct and alternating current. During this year, the first experimental wind-powered station will be established at the station Novo-Alexsievka (South Railway).

"Wide application for the wind-powered installations D-18 can be found in the petroleum and oil industry and on polar stations of the Main Northern Sea Route.

"Theoretical experiments show that even in areas with moderate rates where the yearly averages of wind attain only a speed of 4 - 5 meters per second (central and southern regions of the U.S.S.R.), the wind-powered installation of D-18 can produce during a year up to 63 thousand power hours of energy, thus saving up to 20 g (TRANSLATOR'S NOTE: Just like above, in the case of 'Ga,' it is difficult to judge what 'g' stands for) liquid fuel.

"A wind-powered installation cannot guarantee consumers an energy supply on a rough chart (diagram) without some reserved or accumulated means. Therefore the Soviet windtechnicians work steady in support of such a scheme for a combined windpower station, which would not depend on the whims of a shifting in strength and direction of the wind energy.

"It is aimed to solve this complicated problem (task) by accumulating the energy of wind in a form of compressed hydrogen. The stocks (supply) of hydrogen will be replenished in periods of strong wind. The excessive power of the windmover can be used at this time for disintegration of water into hydrogen and oxygen in electrolyser. In periods of calm or light wind, when the windmover cannot supply the necessary amount of energy, a reserve warm windmover will be switched on, which will use hydrogen for fuel.

"Such a combined wind-powered aggregate (mass) already does not depend on the whims of the wind, and the 'blue coal' (TRANSLATOR'S NOTE: I wonder if the author means something like 'the golden installation' referring to the windmover, rather than actually to 'blue coal') can be put alongside with generally known types of fuel energy resources."

- end -

CONFIDENTIAL/US OFFICIALS ONLY

50X1-HUM

CONFIDENTIAL/US OFFICIALS ONLY

- 3 -

50X1-HUM

"It is of utmost importance to utilize the windmovers of small and medium power for mechanization of the stationary productive processes of the rural economy. Thus, the windmover D-18 working with a centrifugal pump or with a group of small pumps with a pressure of 10 - 20 meters, can secure (guarantee) sprinkling an area of 20 to 35 Ga (TRANSLATOR'S NOTE: 'Ga' may mean 'Garnets,' which in dry measure is equal to 2.56 American quarts or 2.9 liters in metric system; or 'Ga' may be the Russian abbreviation for our hectare') of a watered norm (standard) of 600 to 800 cubic meters water at one watering. In the central black-soil zone of the U.S.S.R., taking into consideration the topographic and wind conditions, by aid of these windmovers one can accomplish the watering up to 10% of the designated-for-watering areas.

"The D-18's wind-powered installation can also be utilized to the utmost with success for complex mechanization of the most difficult processes of cattle breeding, including enforced forage (feed) and electrical lighting of the buildings of the cattle-breeding farms with their big-horned cattle up to 250 head.

"During the autumn-winter period, when as a rule, everywhere the wind becomes stronger, one can transfer the work of the wind-powered installations to be used mostly in rural economy for thrashing machines BDC-34 and BR-23, and also for the utilization of the flour grinding. Windmover D-18, working as a grind-stone installation as well as small rolling-mill, having the equipment for the cleaning of the grain and straining of flour, is able to assure for the medium kolkhoz (collective farm) a supply of flour of high quality and forage grinding.

"The windmovers D-18 can have wide application for strong service of the kolkhoz's productive and artisan workshops, as well as in the field of enterprises of local and industrial co-operatives.

"By decree of October 26, 1947, the Council of Ministers of the U.S.S.R. proposed to the Ministry of rural economy of the U.S.S.R. to rig up and test in 1948 seven D-18 wind-powered installations.

"The Ministry of Transport aims to utilize the wind-electric installations D-18 for supplying small railway stations and adjoining small workers' villages with electric energy of direct and alternating current. During this year, the first experimental wind-powered station will be established at the station Novo-Alexeievka (South Railway).

"Wide application for the wind-powered installations D-18 can be found in the petroleum and oil industry and on polar stations of the Main Northern Sea Route.

"Theoretical experiments show that even in areas with moderate rates where the yearly averages of wind attain only a speed of 4 - 5 meters per second (central and southern regions of the U.S.S.R.), the wind-powered installation of D-18 can produce during a year up to 63 thousand power hours of energy, thus saving up to 20 g (TRANSLATOR'S NOTE: Just like above, in the case of 'Ga,' it is difficult to judge what 'g' stands for) liquid fuel.

"A wind-powered installation cannot guarantee consumers an energy supply on a rough chart (diagram) without some reserved or accumulated means. Therefore the Soviet windtechnicians work steady in support of such a scheme for a combined windpower station, which would not depend on the whims of a shifting in strength and direction of the wind energy.

"It is aimed to solve this complicated problem (task) by accumulating the energy of wind in a form of compressed hydrogen. The stocks (supply) of hydrogen will be replenished in periods of strong wind. The excessive power of the windmover can be used at this time for disintegration of water into hydrogen and oxygen in electrolyser. In periods of calm or light wind, when the windmover cannot supply the necessary amount of energy, a reserve warm windmover will be switched on, which will use hydrogen for fuel.

"Such a combined wind-powered aggregate (mass) already does not depend on the whims of the wind, and the 'blue coal' (TRANSLATOR'S NOTE: I wonder if the author means something like 'the golden installation' referring to the windmover, rather than actually to 'blue coal') can be put alongside with generally known types of fuel energy resources."

- end -

CONFIDENTIAL/US OFFICIALS ONLY

50X1-HUM